ARTICLE V.

A CONTRIBUTION TO THE STUDY OF SUBCONJUNCTIVAL SEROUS CYSTS.

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THERE are certain forms of cystic tumours, occurring beneath the conjunctiva, chiefly of the eyeball but also of the eyelids, but which occupy comparatively little room in the cavity of the orbit, and hence may be separated from the larger and better known class of orbital cysts. They are somewhat rare, and therefore have attracted but little attention, but they seem to be worthy of a closer examination. In considering the nature of these cysts, we must distinguish two forms: *first*, those in which the space filled by the fluid is a natural cavity, that is, one developed physiologically with the growth of the part; and *second*, those in which the cavity is of new formation, from physiological disturbance or some diseased process.

Virchow has taught us that in the same region cysts that are apparently perfectly analogous may be of very different origin, and are therefore of varying significance.

According to Nélaton, cysts in and under the conjunctiva are developed most often from the layer of tissue next the sclera, their size being very variable, ranging from that of a pea to that of a walnut, and their origin is at the best obscure. These cysts, never occupying much orbital space, always develop forwards, pushing the conjunctiva before them, and hence almost always admit of careful examination with the fingers. We thus gain an insight into the consistence, surface, and mobility of the tumour, and may make an exploratory puncture. Yet notwithstanding the comparative facility of examination, a diagnosis of the kind of tumour is not always easy, for a growth, supposed to be a cyst from its softness and fluctuation, may be accompanied by a solid growth. Moreover, lipomata, as well as encephaloid cancers, very often give a sense of fluctuation under the fingers. Another point of somewhat doubtful significance is the mobility of such a growth. In the beginning, serous cysts are always movable, and this freedom of motion may last some time, even when they are growing rapidly; but generally they contract adhesions either with the conjunctiva or with the periosteum of the orbit, and become more or less firmly fixed.

Paget's division of cysts into simple or barren and compound or proliferous, is a sufficiently good one for our purpose. These subconjunctival cysts are always simple or barren: that is, they contain fluid or unorganized matter. They seem always to be formed by the enlargement and union of the spaces in fibro-cellular and areolar tissues. As the fluid in such a tumour collects and increases and the cavity enlarges, the wall of partition between a number of such spaces breaks down, until finally we have one large cavity. If the pressure of fluid continues, a point is reached where the cavity gains a perfect wall or lining, and a pure cyst is formed from a pressing together and union of a number of connective tissue trabeculæ which separated the original areolar spaces from each other. If such a subconjunctival cyst is highly organized, and we have been fortunate enough to remove it entire, or in greater part, it is found on microscopical examination that the wall of the sac consists of fine fibro-cellular tissue, which may run in a single layer, though more commonly in several. Among these fibres are many nuclei, and the inner surface of the sac is sometimes lined by a single layer of squamous epithelium. In most cases, however, it is very difficult or next to impossible to remove the cyst uninjured owing to its firm adhesions to the surrounding parts.

Sometimes, however, there does not seem to be anything like a cyst wall; but the fluid seems to have been poured out or secreted in the subconjunctival areolar tissue, breaking down the trabeculæ, but apparently not exerting enough pressure to bring about a condensation of the connective tissue filaments into a distinct wall. Here the microscope shows no lamination or stratification of the fibres, and of course no epithelial lining. Some nuclei are indeed met with, but no more than might be expected in any fibro-cellular tissue.

These cysts do not all contain a serous fluid, though most of them do. Occasionally one is met with which contains an oily fluid. Mr. Hunter* cites a case of an oily encysted tumour which grew between the bony orbit and the upper eyelid of a young gentleman, and its contents he describes as "pure oil, perfectly clear and sweet." Schuh also relates two cases of cysts under the brow, which contained similar oily matter. Whence this oily secretion comes from it is still impossible to say. Whether it is secreted as such, or whether it results from the fatty metamorphosis of the epithelium which lines the wall of the sac, is still an unsolved question.

The causation of these cysts is still but little understood. In looking for a cause in the tissue in which the tumour is met with, the question of the local tendency or disposition comes up, and this tendency of fluid cysts to develop in areolar connective tissue is well marked. Whether heredity comes in as a factor is a matter of doubt in the particular class of cysts under consideration. Though some of them are really congenital, in the narrow sense of the word, yet the number of observed cases is still so small that no statistics can be drawn from them. Hence the question of heredity, as well of the tendency to the development of such cysts, as of the actual growths themselves, must still be regarded as unsettled.

When these cysts have a sac-wall or enveloping membrane, it is sometimes excessively delicate, and resembles a serous membrane on its inner aspect. Pathology seems to show that the cysts with moderately thick walls, which in some cases attain the thickness and density of the dura mater, generally contain either sebaceous matter alone, or else sebaceous matter and a dirty serous fluid mingled together. Demarquay considers that this latter variety of cysts originates from the conjunctiva, and Walton reports a case in a child of four years, in which the tumour extended deeply into the orbit. (Demarquay, *Tumeurs de l'Orbite*, Paris, 1860, p. 392.) As distinct from this variety, cysts are occasionally found secreting their own contents, which owe their origin to certain canals, the orifices of which have become more or less completely obstructed. Thus simple serous cysts are met with in the eyelids, under the conjunctiva, and along the edge of the tarsal cartilage, where they seldom acquire more than a moderate size, and their removal is effected with little or no difficulty. (Hodgkin, *Med. Chirurg. Trans.*, xv., 1829.) This variety of cysts, however, consisting in abnormal dilatation of a normally existing tube or cavity, from obstruction of its orifice, does not concern our subject.

We meet with these cysts most often among children and young adults. In none of the cases which came under my observation was there any history of injury of the region, nor in fact anything which could be attributed as a cause; thus differing from pure orbital cysts, where there is almost always some history of blow or fall upon the orbit, which we are accustomed to regard as a cause of the development of the cyst.

These fluid cysts occur either at the internal or at the external angle of the eyelids, more often at the latter. Kerst thinks there is some connection between the contents of these tumours and the region where they occur. He cites a case of subconjunctival encysted tumour, which occurred at the side of the lachrymal gland at the external angle of the right upper lid, and which was prolonged somewhat deeply into the orbit. It was spherical or nearly so, the size of a chestnut, and contained a cloudy fluid something like sebaceous or concentrated purulent matter, and a large number of small hairs, resembling cilia. The cyst was removed entire. Kerst thought there was a connection between the nature of the hairs found in cystic tumours and that of hairs of the regions whence these growths spring.

Another place where these cysts occur is that overlying or immediately in front of the lachrymal sac, along the inner angle of the eyelids and side of the nose. These pre-lachrymal cysts had not been mentioned in literature until Verneuil reported three cases to the Société de Chirurgie de Paris, December 27, 1876, which were published in the *Recueil d'Ophthalmologie* for January, 1877. (See *Am. Journ. of Med. Sci.* for April, 1877, p. 549.) They have no direct connection with the lachrymal sac, and their origin is in most cases probably congenital. Their contents strongly resemble olive oil.

Verneuil's *first* case was in a young man, and was situated in front of the lachrymal sac. It was as large as a cherry, was indolent, irreducible by pressure, and of long standing. On being opened a liquid like olive oil appeared. No injection of iodine was made; the patient went away and never returned. His *second* case was in a young woman, æt. 19, and was also the size of a cherry. It stood a little higher than the lachrymal sac, and the skin over it was greatly distended and very thin. It dated back to early childhood. Its contents were also oily. The anterior three-fourths of the cyst were excised, but the remainder, being very adherent to the deeper parts, was left *in situ*. The wall was found covered by stratified pavement epithelium. The liquid coagulated, and contained numerous crystals of cholesterine and margaric acid. His *third* case was in a man, æt. 31, was as large as an almond, transparent, and dated from infancy. It was apparently adherent to the periosteum. The cyst was punctured, two or three grammes of oily liquid exuded, and after the cyst was entirely emptied, there was felt a small depression in the bones at the inner angle of the orbit.

The origin of the oily contents is unknown. There are certain cysts of the thyroid body and ovary which have similar contents.

Sichel gives two representations of serous cysts of the conjunctiva in his *Iconographie*. One of them was communicated to him by Sömmering, and here the cyst was situated very closely to the lower border of the cornea. From the symptoms and results this case, however, more properly belongs to the class of orbital cysts.

Another interesting case is reported by Brière, in the *Annêe Mêdicale de Cæn*, II., No. 3.

The patient was a girl, æt. 17, in whom a small tumour had appeared in early childhood at the inner angle of the right eye, just back of the caruncle, and had slowly grown to the size of a walnut. A cyst was diagnosticated, opened, and emptied of a clear serous fluid. The wound was then enlarged, and the entire inner surface of the cyst cauterized by a saturated solution of the chloride of zinc. This was repeated several times during a number of weeks. The cavity closed very slowly, and was not entirely healed until five months had elapsed.

The following cases, each of which presented some peculiar features, have been under my own observation during the past few years.

CASE I. *Subconjunctival Serous Cyst.*—Harry B., æt. 4; first seen in January, 1876. The child was sent to me from the country for a growth in the orbit. About five months before, the parents had first noticed a slight swelling at the external canthus of the right eye, and just below the upper orbital margin. This slowly increased in size without causing any pain or disturbance in mobility of the eyeball, until it has reached the size of a flat Lima bean, which projects forward and downward from the orbit. The conjunctiva was pushed before it, was freely movable over it, and there was no increase of bloodvessels crossing it. The tumour could be pushed backward somewhat into the orbit, and with the finger inserted between it and the superior orbital margin, it was found that the growth was adherent to the external and superior wall of the orbit. The tumour was translucent, fluctuating, and movable; and a diagnosis was made of a fluid cyst. An exploratory puncture was made with a small trocar through the most prominent part of the cyst, and about two drachms of a light straw-coloured and perfectly clear fluid evacuated. The opening was then enlarged horizontally, and an attempt made to dissect out the cyst. But there was no distinct cyst wall to seize upon, and the adhesions were found to be so broad and deep that the attempt was given up. A portion of the cyst next the opening was snipped off and laid aside for microscopical examination. A twisted strand of fine suture silk was introduced as a means of drainage, the cavity being first carefully washed out by syringing with warm water, and the child was left in bed without any bandage. Somewhat violent reaction followed the operation, owing to the attempts made to dissect out the cyst; the conjunctiva became reddened and chemotic, and the lids were hot and swollen. There was a free discharge of pus through the wound on the second day, however, and all unpleasant symptoms then subsided. Pus drained away freely; the cavity gradually closed, and at the end of the fourth week the little patient was discharged cured, without there being any sign left of the previous existence of a tumour. The eyeball was freely movable in all directions.

The portion of cyst which was removed was hardened in potas. bichrom. solution, and then submitted to examination. The ordinary characteristics of the subconjunctival areolar tissue were well marked, but there was no sign of any attempt at the formation of a cyst wall. In places, the connective tissue fibres were somewhat pressed together, so as to give an appearance of greater density, and here and there was an agglomeration of nuclei, but there was no arrangement of laminæ in the course of the fibres, and not a trace of any epithelium. There was nothing to point to there having been any connection between the cavity of the cyst and the lachrymal gland, nor was there anything found to suggest dilatation of one or more of the excretory lachrymal canals. It seemed to have been a collection of clear fluid in a formless space under the conjunctiva. The fluid proved to be alkaline, slightly albuminous, and contained a few crystals of cholesterine, but there was not enough of it to determine its specific gravity.

Case II. *Subconjunctival Serous Cyst.*—David F., æt. 5, first seen in April, 1877. A well-developed fair-haired boy, but not very bright. The mother states that at the outer angle of the left eye there has been a small tumour since birth, which increased very slowly in size up to six months ago, since which time it has grown quite rapidly. It is now the size of a large almond, projects decidedly beyond the orbital margin, pushing the conjunctiva and lower lid before it, and is situated apparently in the inferior cul-de-sac, in front of, and to the outside of the eyeball. The lower lid is very prominent over the swelling. The surface of the tumour seems to be pigmented, the conjunctiva is freely movable over it, and the motions of the eye are unimpeded. The tumour is moderately firm, but fluctuating, and can be moved in any direction. On examining the child more closely, there was found a malformation of the left ear. There was a very small and very much deformed concha, the lobe being entirely separated from it, and no external auditory canal. The child always turns the other side of the head to any one speaking, and a watch pressed against the rudimentary concha is not heard, nor are the vibrations of a tuning-fork when held close to that side of the head. When, however, a vibrating fork is placed against the forehead or teeth, the child says he hears the sound on both sides.

A diagnosis of a fluid cyst being made, an attempt was made to remove it entire through a long horizontal incision. But though great care was exercised in making the cut, the cyst had such very thin walls that the pressure of a pair of forceps ruptured it at its most prominent point, and a large quantity of colorless fluid escaped. The swelling almost immediately subsided, and the lower lid resumed almost its normal position, but there seemed to be considerable thickening of the areolar tissue about the cul-de-sac. No drainage silk was used in this case, as I wished to see whether the cyst would refill, but simple cold water dressings and a bandage. There was no reaction at all, and the bandage was removed on the second day. I saw the child the following week, and there was no apparent change in his appearance, and the hypertrophied condition of the subconjunctival tissue was about the same. Since then, the patient has never returned, and I know nothing further of the case. The serous cyst was probably of the same nature as the previous case, and had no distinct cyst wall, but in regard to its origin it is somewhat different. The cyst here was evidently congenital, was a deformity, and in view of the rudimentary ear of the same side, it might be regarded as a malformation, but of what seems difficult to say. It was probably not connected with the lachrymal gland or its excretory ducts, for it was in the lower cul-de-sac. The left eye itself was perfectly normal in every way.

CASE III. *Subconjunctival Prelachrymal Cyst.*—Maria M., æt. 50, first seen in February, 1877. The patient had always been in good health, and had had very strong eyes till about two years back, when she caught cold in her eyes, which became violently inflamed. From her description, this was probably conjunctivitis of both eyes, with a subsequent dacryocystitis on the left side. The lower canaliculus on this side had been slit up, and she said that a probe was passed for a long time. About eight months ago she noticed a small swelling which made its appearance at the extreme inner angle of the left eye, just above the caruncle, which, she said, seemed to come down from under the upper lid. This tumour has steadily increased in size, and has pushed the conjunctiva of the upper cul-de-sac before it towards the eyeball, and has also pushed the skin forwards just above the internal tarsal ligament. On examination there is seen in front of, and above the site of the lachrymal sac, a swelling the size of a large walnut, of firm, resilient consistency, with no decided fluctuation, which slips about under the fingers like a marble. The skin is pushed forward over it, but is freely movable, showing that no adhesions exist. The tumour also extends backwards and downwards towards the eye, coming down between the upper lid at its inner angle and the eyeball, pushing the lid away from the globe and the caruncle outwards and downwards. The conjunctiva is freely movable over it. There was still an occasional discharge of pus from the sac. Pressure upon the tumour, however, did not cause this, and there was a sensation felt under the finger which was totally distinct from that felt in pressing upon a lachrymal sac filled with pus. A diagnosis of fluid cyst was made, and an exploratory puncture with a small trocar gave exit to about a drachm of slightly turbid, glairy fluid. The trocar was introduced posteriorly through the conjunctival cul-de-sac. The swelling immediately diminished very much in size, but still not entirely, and a closer examination showed very decided thickening of the walls of the cavity. It was then determined to dissect out the sac-wall if possible, and to this end a vertical incision was made externally through the skin, reaching from the superior orbital margin down to the internal tarsal ligament. The skin with the thin layer of subcutaneous adipose tissue was carefully dissected away, and the fibres of the orbicular muscle were then seen, somewhat thinned and separated by spaces, and very pale. Underneath this was a yellowish-gray glistening appearance, which could be easily separated and dissected up from the surrounding tissues. By working carefully with the handle of a scalpel and blunt scissors, the cyst wall was finally removed entire after about half an hour's work, and the hole found on its posterior surface where the trocar had entered. Here the sac-wall lay immediately beneath the conjunctiva. On examining the cavity from which the cyst was removed, it was found to lie, as suspected, directly in front of, and to the outside of the lachrymal sac, from which it was only separated by a little adipose tissue. The cavity was limited below by the upper margin of the internal palpebral ligament, but above it reached nearly to the superior orbital margin. There was considerable hemorrhage during the operation, and the oozing continued until the cavity had been stuffed with small bits of sponge. A probe was introduced into the lower canaliculus and passed readily to the bottom of the nasal duct, proving that there was no obstruction, and that the original operation for cure of the stricture had been effectual. Six hours later, the pieces of sponge were removed and the cavity well washed out with water. A strand of coarse suture silk was then introduced for drainage purposes, and cold applications made. There was very little reaction, the cavity began to granulate from the bottom, the discharge of pus was moderate, and on the twenty-fourth day the patient was discharged with the wound entirely closed, very little prominence of the skin over the seat of the tumour, and not a very marked linear cicatrix.

The fluid was albuminous, neutral in reaction, and contained cholesterine crystals.

The cyst presented a smooth, glistening appearance on its internal surface, but was rough and uneven on its exterior, owing to the divided and broken adhesions. Its wall was about half a line in thickness. After hardening in a solution of potassium bichromate, and then in alcohol, sections were made of the cyst wall and placed under the microscope. It proved to be composed entirely of well-developed connective-tissue fibres, densely packed together, with well-marked nuclei, and here and there some free nuclei. There was no distinct lamination, but the fibres appeared to run parallel to one another, and as closely as is met with in the sheaths of tendons. The inner surface was covered by a single layer of pavement-epithelial cells, each with a distinct nucleus. The outer edge of the sections showed where the looser areolar tissue, forming the adhesions, had been broken away by the process of dissection.

The origin of this cyst it seems impossible to determine. I could see no connection between its development and the dacryocystitis which had existed for some time. There was no history of any injury, such as occasionally gives rise to orbital serous cysts, and there is no bursa in this region which might develop into a cyst from hypersecretion of its contents.

CASE IV. *Subconjunctival Cyst of the Caruncle.*—Patrick M., æt. 12, first seen in April, 1874. The patient is a well-developed Irish boy, who had never had any trouble with his eyes, except this tumour, until within a few weeks. The parents stated that in early infancy a small swelling had appeared at the inner corner of the right eye, and had very slowly increased in size, but had never occasioned any trouble, nor had the eye ever been red or inflamed. About two weeks before I saw him, the child was attacked by an ordinary catarrhal conjunctivitis, for which he was brought to the infirmary. Since then, the mother said, the swelling had grown more rapidly, had become red, and was somewhat painful. On examination I found a small, red, fluctuating tumour, about the size of a large bean, occupying the site of the caruncle of the right eye, freely movable and sensitive to the touch. The pain was probably due to the pressure upon the inflamed conjunctiva. Supposing this to be a colloid cyst of the caruncle, which are not uncommon in this situation, the cyst was punctured with a broad needle. The moment the needle was with-drawn, a small quantity of clear serous fluid was poured out and the tumour collapsed to less than the size of the normal caruncle. The conjunctivitis was then treated in the ordinary way by weak solutions of alum, but on the fourth day the cyst was as large as ever. The contents were again evacuated as before, but the cyst again refilled, and on the ninth day, after puncturing it, the opening was enlarged, and the inner surface of the sac cauterized by a fine pencil of nitrate of silver. This caused suppuration of the sac, which soon, however, ceased, the cyst contracted and eventually disappeared almost completely, and gave the appearance of a deeply sunken caruncle, such as we sometimes see after tenotomy of the internal rectus for convergent squint.

CASE V. *Serous Cyst of the Caruncle.*—Sophie S., æt. 40, first seen in September, 1876. This patient had never any affection of the eyes until six months ago, when she first noticed a little protuberance of a pearly colour at the internal canthus of the right eye, which slowly increased in size. There was never any pain or redness of the part. When I saw her there was a swelling the size of a bean, situated just in front of the caruncle of the right eye, which pressed forward and downward upon the lower canaliculus and caused considerable epiphora. Having forgotten the occurrence of the previous case, which resembled this very closely, except in the one particular of coming on in adult life, a diagnosis was made of colloid cyst of the caruncle, and the tumour was punctured. Instead of a colloid mass exuding, a clear serous fluid made its appearance, and the swelling collapsed. I then recalled to mind the other case, and was consequently prepared to see this cyst fill up again. To avoid this, the opening was enlarged and the interior of the sac cauterized, as in the preceding case. The result was the same—moderate reaction, suppuration for a few days, then closure and contraction of the cyst wall, and no return.

The development of a serous cyst in the lachrymal caruncle, as exemplified by these two cases, is somewhat singular. Anatomically considered, the caruncle is an aggregation of small hair follicles, held together by connective tissue, with sebaceous glands and fat cells lying between the follicles. Colloid and sebaceous cysts might naturally be expected here, and do occur, and even small fatty tumours are occasionally met with, but I am not aware of any case of serous cyst of the caruncle having been previously reported. From the rapid contraction of the cyst walls, and the deep sinking-in of the remainder of the tumour after final evacuation, it is probable that the original constituents of the caruncle had been absorbed more or less completely and their space occupied by fluid, and this being discharged, nothing remained but an extremely thin outer layer or surrounding membrane, and hence the very small size of the caruncle.

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